

Introduction to Botany. Lecture 26

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Outline

- 1 Questions and answers
- 2 Life cycles
 - From general life cycle to the life cycle of angiosperms
 - Angiosperms
- 3 Flower

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Previous final question: the answer

If reproduction via seeds is better than reproduction via spores, why there are 10,000 species of ferns and only 600 species of gymnosperms?

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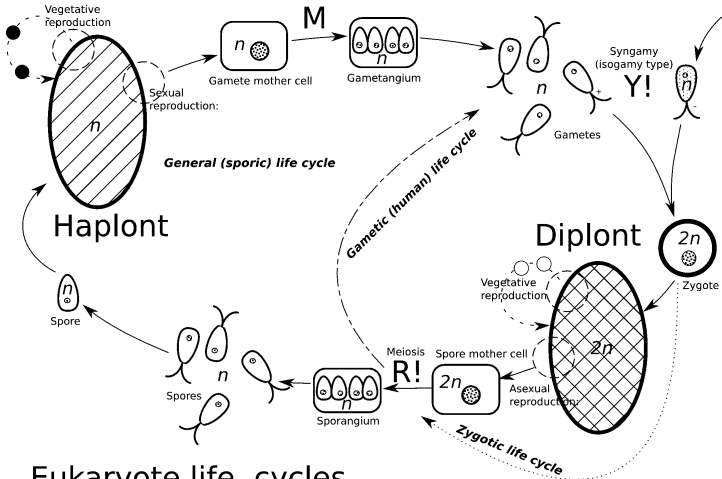
If reproduction via seeds is better than reproduction via spores, why there are 10,000 species of ferns and only 600 species of gymnosperms?

- Cycle is slower and requires pollination
- Ferns had more time to develop species

Life cycles

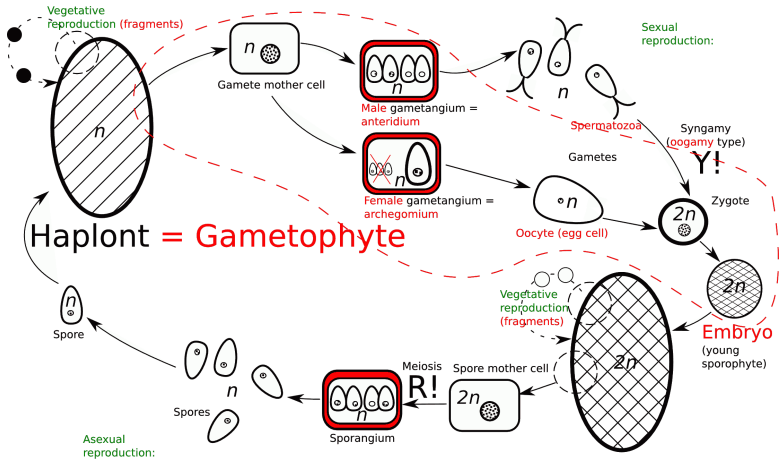
From general life cycle to the life cycle of angiosperms

General life cycle



Eukaryote life cycles

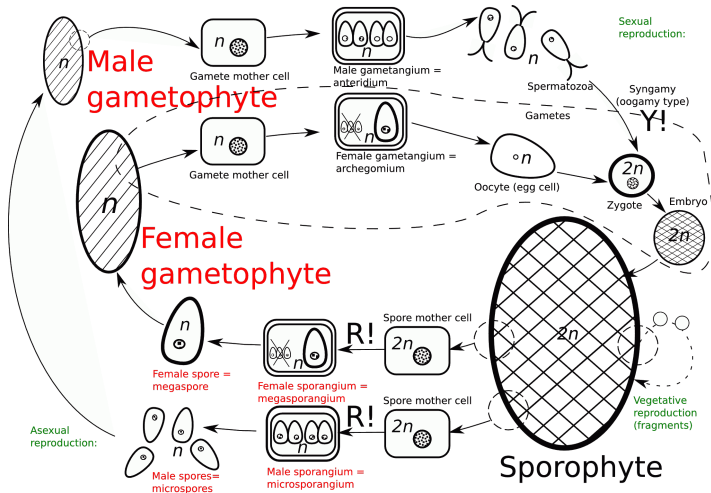
Life cycle of land plants: differences



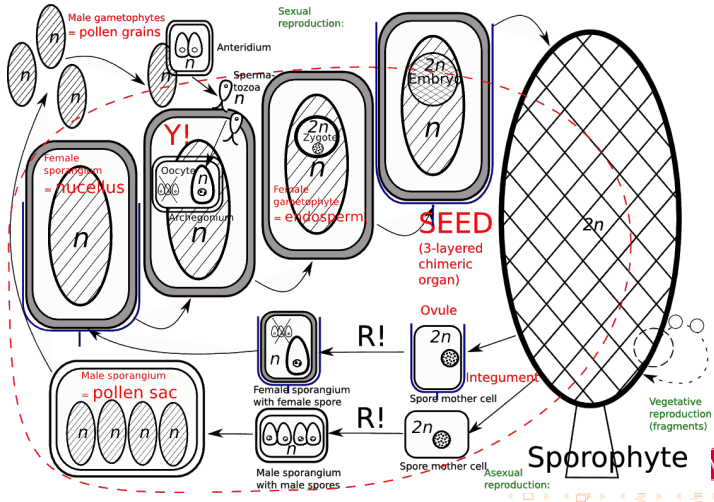
Haplont = Gametophyte

Diplont = Sporophyte

Heterosporic cycle: differences



Life cycle of seed plants: differences from heterosporic ferns



Life cycles

Angiosperms

Life cycle of angiosperms: differences

- Reduction of gametophyte: 3-celled pollen and 7-celled embryo sac
- No archegonia and anteridia
- Spermatia, pollen tube
- Double fertilization
- New endosperm (second embryo)
- Cupule (pistil) and fruit
- In general, **angiosperms have accelerated life cycle** needed for fast-growing herbs

Life cycle of angiosperms

Terms covered:

- Embryo sac, antipodes, synergids, central cell
- Spermatia, pollen tube
- Double fertilization
- Pistil and fruit

Life cycle of angiosperms: sources of optimization

- Reduction of everything, especially of haploid stages
- Signal role of second embryo (source of endosperm₂)
- Well-developed pollination

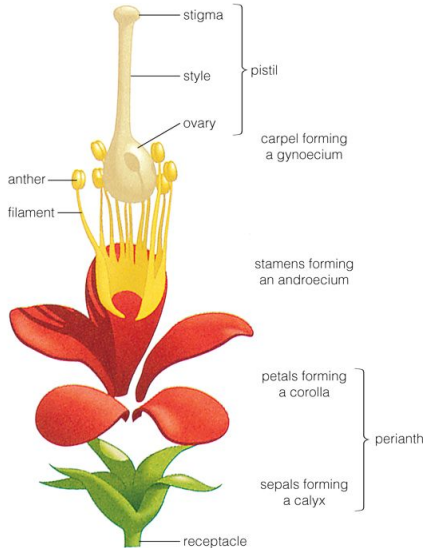
Definition of flower

- Compact generative shoot (= floral unit, FU) with three zones
- Three main zones: sterile (perianth), male (androecium) and female (gynoecium)
- General characters: sex, merosity, symmetry, position of gynoecium

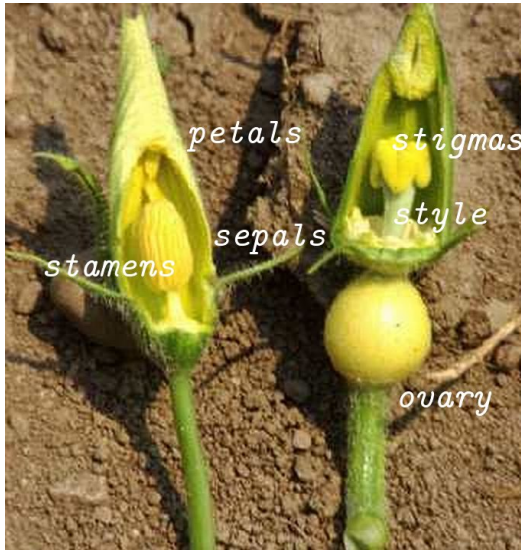
Structure of flower

- Perianth
 - Simple perianth (consists of tepals)
 - Double perianth
 - Calyx (consists of sepals)
 - Corolla (consists of petals)
- Androecium (consists of stamens)
 - Filament
 - Anther (consists of pollen sacs)
- Gynoecium (consists of pistils)
 - Ovary (consists of carpels)
 - Style
 - Stigma

Structure of flower



Pumpkin (*Cucurbita pepo*) flower



Summary

- Angiosperms optimized their life cycle using (a) reduction, (b) signaling second embryo and (c) sophisticated pollination
- **Flower** is a compact three-zoned generative shoot
- Three main zones of flower: sterile (**perianth**), male (**androecium**) and female (**gynoecium**)

Final question (2 points)

Final question (2 points)

What is a flower?

For Further Reading



J. E. Bidlack, Sh. H. Jansky.
Stern's introductory plant biology. 12th edition.
McGraw-Hill, 2011.
Chapter 8.



Th. L. Rost, M. G. Barbour, C. R. Stocking, T. M. Murphy.
Plant Biology. 2nd edition.
Thomson Brooks/Cole, 2006.
Chapter 13.